LLNL Environmental Restoration Division Standard Operating Procedure	TITLE: Sampling Monitor Wells with a Bailer
APPROVAL Date _____ _____ Environmental Chemistry and Biology Group Leader	PREPARERS: R. Goodrich REVIEWERS: R. Brown*, T. Carlsen, E. Christofferson*, V. Dibley, J. Duarte, B. Failor*, J. Greci, B. Hoppes*, G. Howard, and B. Ward*
APPROVAL Date _____ _____ Division Leader CONCURRENCE Date _____ _____ QA Implementation Coordinator	PROCEDURE NUMBER: ERD SOP-2.4 REVISION: 2 EFFECTIVE DATE: December 1, 1995 Page 1 of 7

*Operations and Regulatory Affairs Division

1.0 PURPOSE

To obtain a representative sample of the ground water from monitor wells using a bailer.

2.0 APPLICABILITY

This procedure applies to all field personnel using a bailer to purge and collect ground water samples from a monitoring well .

3.0 REFERENCES

3.1 deVera, E. R., B. P. Simmons, N. D. Stephen, and D. L. Storm (n.d.), *Samplers and Sampling Procedures for Hazardous Waste Streams*, U.S. EPA, Washington, D.C. (EPA-600/2-80-018).

3.2 Ford, P. J., P. J. Tarina, and D. E. Seely (1984), *Characterization of Hazardous Waste Sites—A Methods Manual, 302. Vol. II of Available Sampling Methods*, 2nd ed., U.S. EPA, Washington, D.C. (EPA/600/4-84/076).

3.3 Korte, N. and D. Ealey (1983), *Procedures for Field Chemical Analyses of Water Samples*, U.S. Department of Energy, GJ/TMC-07, Technical Measurements Center, Grand Junction Project Office, Grand Junction, Colo.

3.4 Korte, N. and P. Kearl (1985), *Procedures for the Collection and Preservation of Groundwater and Surface Water Samples and for the Installation of Monitoring Wells*, Second Edition, U.S. Department of Energy, GJ/TMC-08, Technical Measurements Center, Grand Junction Projects Office, Grand Junction, Colo.

3.5 National Council of the Paper Industry for Air and Stream Improvement, Inc. (1982), *A Guide to Groundwater Sampling*, National Council for the Paper Industry Technical Bulletin No. 362.

3.6 U.S. Department of the Interior, (n.d.), *National Handbook of Recommended Methods for Water-Data Acquisition*, Washington, D.C.

3.7 U.S. EPA (1983), *Methods for Chemical Analysis of Water and Wastes*, Washington, D.C. (EPA-600/4-79-020).

3.8 U.S. EPA (1994), *Test Methods for Evaluation of Solid Waste*, Third Edition, Washington, D.C. (EPA-SW-846).

3.9 U.S. EPA (1985), *Practical Guide for Groundwater Sampling*, Washington, D.C. (EPA-600/2-85/104).

3.10 U.S. EPA (1986), *RCRA Groundwater Monitoring Technical Enforcement Guidance Document*, Washington, D.C. (OSWER-9950.1).

3.11 U.S. EPA (1992) *RCRA Groundwater Monitoring: Draft Technical Guidance*, Washington, D.C. (EPA/530-R-93-001).

4.0 DEFINITIONS

4.1 Bailer

A bailer is recommended for evacuating shallow, small-diameter wells or larger diameter wells with low yields and/or small casing volumes. A bailer is a small-diameter cylindrical-shaped tube made from Teflon, stainless steel, polyvinyl chloride (PVC), or polyethylene materials. A check ball is housed in the bottom of the tube. The check-ball rises as the tube is lowered downhole allowing the tube to fill with water. As the tube is raised to the surface, the check-ball seats, preventing water loss. To collect a sample from the tube, a bottom-emptying device is inserted into the tube which expels the water. Appropriate sample containers are then filled.

5.0 RESPONSIBILITIES

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

5.2 Field Personnel

The field personnel are responsible for the safe completion of evacuating and sampling ground water monitor wells according to guidelines set forth by this procedure and associated SOPs.

5.3 Field Support Personnel

The field support personnel's responsibilities are to provide the appropriate equipment, collection devices, and general field support to assure that field activities are performed in a timely and efficient manner. Field support personnel are also responsible for adhering to all applicable ERD SOPs.

5.4 Sampling Coordinator (SC)

The SC's responsibility is to supply a quarterly Routine Ground Water Sampling Schedule. In addition to providing an overall sampling plan, the SC has the option to provide a specific sample plan for each day (Daily Operations Guide). The technical information required for purging wells is also provided by the SC in the Well Specification Table.

6.0 PROCEDURES

6.1 Bailer Construction

Bailers (used for well evacuation) can be constructed from a number of materials, including Teflon, stainless steel, or polyvinyl chloride (PVC). However, construction materials for bailers used as sampling devices should be limited to stainless steel or Teflon. Typically, Teflon bailers are used in wells that have <5,000 µg/L (ppb) concentration of Volatile Organic Compounds (VOCs). Dedicated polyethylene bailers are used to sample wells that have >5,000 µg/L of VOCs. Equipment blanks are performed at installations where nondedicated Teflon bailers are used according to SOP 4.9, "Collection of Field QA/QC Samples."

6.2 Discussion

Bailers are useful tools for the collection of grab samples and when other sampling equipment is not effective. Disturbance of the ground water sample should be avoided since excessive agitation of the sample results in aeration. This disturbance can be minimized by carefully lowering the bailer into the well (not dropping it), and by using a bailer that can be fitted with a bottom-emptying device. This type of bailer has a threaded check-ball opening, which allows the attachment of a threaded Teflon stop-cock. The stop-cock allows controlled sampling from the bailer. Attachment C in SOP 2.1, "Presample Purging of Wells," contains a schematic of a bailer and stop-cock.

6.3 Office Preparation

6.3.1 Prior to commencement of field activities, field personnel shall review the appropriate Site Safety Plan and all applicable SOPs. Current copies of the documents shall be retained in the sample vehicle at all times.

6.3.2 Review all pertinent sampling information such as the quarterly Routine Sampling Schedule and Well Specification Table provided by the SC. The schedule contains the following information:

- Well to be sampled.
- Requested analysis.

- Contract analytical laboratory to which samples are to be sent to for analyses.
- Estimated amount of purge water to be collected, and where and how it will be treated.

6.3.3 Obtain appropriate data collection forms (i.e., Chain-of-Custody [CoC] forms, Ground Water Sampling Logs [SOP 2.1, Attachment A], and assigned field logbook).

6.3.4 Purge Water Collection

A. Site 300

After consulting with the SC, the field support personnel must ensure that wells have sufficient collection drums available at the well head for purge water containment (SOP 4.7B, "Site 300 Treatment and Disposal of Well Development and Well Purge Fluids"). The quantity of purge water to be collected for each well is listed in the Routine Sampling Schedule.

B. Livermore Site

The SC will provide a specific order of wells to be sampled, in order to efficiently coordinate placement of presample purge water collection tankers. Tankers and drums containing purge water may not be left at the well location and will be logged and disposed of according to SOP 4.7A, "Livermore Site Treatment and Disposal of Well Development and Well Purge Fluids."

6.3.5 The number and type of sample containers needed for the sampling event should be obtained from the SC's supply (either from Building 833 at Site 300 or directly from the SC). The SC should keep a sufficient stock of sample containers and field personnel should inform the SC when the supply needs replenishing by the contract analytical laboratory (CAL). The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirement. Refer to SOP 4.3, "Sample Containers and Preservation."

6.3.6 Check supplies (disposable 0.45 µ fiber filters, trip blanks, field blanks, plastic bags, etc.), and to avoid running out during an emergency inform the SC when the supply level is low.

6.3.7 Locate the line to be used when lowering the bailer into the well. Cotton or nylon rope may be used. The rope should be new, unused, or has been dedicated to the monitor well to be sampled.

6.3.8 Field personnel should notify the SC when collecting interlaboratory collocated samples, so that arrangements can be made with the CAL courier for sample pickup. If necessary, the Livermore Site Ground Water Monitoring SC will request interlaboratory collocated samples on a daily basis.

6.3.9 The field personnel will notify the SC when collecting samples with short holding times (i.e., hexavalent chromium, fecal and total coliform). The CAL SC will alert when samples are being collected so the laboratory can prepare for the analysis.

6.3.10 Organize sampling route:

A. Site 300

1. Complete an entire study area before beginning the next.
2. Sample all clean wells within a study area first.

3. Proceed to sample wells, working from the least contaminated to the most.

B. Livermore Site

The SC will specify the area and order of well sampling (if necessary).

6.3.11 The Administrative Escort Services must be given a 24-hour notice before work is scheduled in restricted areas.

6.4 Field Preparation

6.4.1 If bailers were not previously used for the presample purging according to SOP 2.1, then clean and check bailers and stop-cocks for proper operation. Bailers should be checked for cracks and breaks that could cause sample and bailer loss, or operator contamination. Ensure that new clean rope is used and is cut to the appropriate length according to the casing depth of the well.

6.4.2 Obtain coolers, trip blanks, field blank water, ice, filters and preservatives. Refer to Attachment B, Equipment Checklist in SOP 2.1.

6.4.3 Fill out initial information on the Ground Water Sampling Log and Water Sampling Logbook per the instructions in SOP 4.2, "Sample Control and Documentation."

6.4.4 Decontaminate nondedicated bailers according to SOP 4.5, "General Equipment Decontamination," if the bailer has not already been in use for the presample purging (SOP 2.1).

6.5 Operation

6.5.1 Once presample purging is complete according to SOP 2.1, sampling may begin. Wear a pair of clean, surgical-type disposable gloves during sampling. Temperature, pH, and specific conductance should be measured immediately prior to sampling according to SOP 2.2, "Field Measurements on Surface and Ground Waters." Instruments should be calibrated according to SOP 4.8, "Calibration/Verification and Maintenance of Field Instruments Used in Measuring Parameters of Surface and Ground Water and Soils."

6.5.2 The retrieval line should be securely attached to the bailer. If using nylon or cotton ropes, ensure that the bailer is secured by tying a bowline knot.

6.5.3 The free end of the retrieval line should be securely fastened to the protective casing or the sampler to avoid losing the bailer in the well.

6.5.4 Lower the bailer (without the stop-cock) gently into the well. Avoid unnecessary agitation of the water.

6.5.5 Remove the bailer and attach the bottom-emptying stop-cock with the stop-cock in the closed position. A ring stand fitted with clamps to hold the bailer greatly facilitates this procedure.

6.5.6 Fill the appropriate sample bottles (SOP 4.3, "Sample Containers and Preservation") from the stop-cock. Allow water to flow gently down the side of the bottle with minimal entry turbulence (SOPs 2.6 and 3.1). If sampling for VOCs, refer to SOP 2.6, "Sampling for Volatile Organic Compounds," should be

followed. If a stop-cock is not available, obtain the sample by gently pouring from the top of the bailer, avoiding excessive agitation.

6.5.7 Samples should be obtained in order of volatility; VOCs collected first, followed by semi VOCs, radiologicals, and inorganics. All samples should be placed in Ziploc-type bags. VOCs should be placed on their sides in the coolers. The samples requiring preservation of 4°C should be cooled down by using Blue ice packs in Ziploc-type bags or double-bagged ice cubes. Loose ice may be used when samples need to be rapidly cooled, but should be replaced with double-bagged or blue ice before shipping.

6.5.8 If filtering and/or preservation is required, include a notation on the COC instructing the CAL to filter and/or preserve samples upon receipt. Alternatively, an electrical vacuum-pump filtration device fitted with a disposable 0.45 µ fiber filter can be used as long as it is not constructed from materials that may interfere with the analyses, and is approved by the SC.

6.5.9 Leave routine samples and proper documentation for the primary analytical laboratory (in the environmental sample lock-box). Deliver non-routine and/or radiological samples to the SC for shipment and/or distribution to on-site laboratories. Ensure that the samples requiring preservation remain at 4°C ± 2°C, by adding fresh ice whenever necessary, but do not allow them to freeze. Always ensure that proper chain of custody is maintained.

6.6 Post Field Operation

6.6.1 Before leaving the sampling location, cross check the samples collected with those requested by the SC, and/or note any discrepancies. To cross check refer to SOP 2.1, Attachment A.

6.6.2 Prior to sampling another site and to prevent cross contamination of equipment between locations, thoroughly decontaminate all equipment that is not dedicated according to SOP 4.5, "General Equipment Decontamination."

6.6.3 Complete the appropriate Ground Water Sampling Log and record sampling information in the designated Water Sampling Logbook (SOP 2.1 and SOP 4.2,).

6.6.4 Verify that the CoC is appropriately completed per SOP 4.2. Indicate any special instructions in the Remarks Section of the CoC. Such instruction may include filtering and preserving the sample upon receipt. Also, for wells that are listed on the sampling plan as Clean Wells or for any well that is expected to be free of contamination write, "Verify any positive detections and call _____." The blank should be filled in with the appropriate QC Chemists name and phone number.

6.6.5 When appropriate, mark the sampling location and ID on a copy of the a site map. Mark the field location by driving a labeled stake wrapped with fluorescent marker tape adjacent to where the samples were collected. This stake is the reference point should the location need to be subsequently surveyed.

6.7 Office Post Operation

6.7.1 Deliver all field logbook notes, ground water sampling logs, and CoC forms weekly to the SC. Deliver or fax copies of completed CoCs daily to the SC.

6.7.2 The SC will retain a copy of the original forms (CoC, ground water sampling log), and provide the originals to the Data Management Group (DMG) for final archive. The DMG will provide copies of the forms to the appropriate Operations and Regulatory Affairs Division Analyst, as necessary.

7.0 QA RECORDS

7.1 LLNL Ground Water Sampling Log

7.2 Logbooks

7.3 Chain-of-Custody forms

8.0 ATTACHMENTS

Not applicable.